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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/621,863      | 07/16/2003  | Tingkai Li           | SLA0709             | 1755             |

7590 02/24/2004

David C. Ripma  
Patent Counsel  
Sharp Laboratories of America, Inc.  
5750 NW Pacific Rim Boulevard  
Camas, WA 98607

EXAMINER

LEE, HSIEN MING

|          |              |
|----------|--------------|
| ART UNIT | PAPER NUMBER |
|----------|--------------|

2823

DATE MAILED: 02/24/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/621,863

Applicant(s)

LI ET AL.

Examiner

Hsien-Ming Lee

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,5,9 and 15 is/are rejected.
- 7) ☒ Claim(s) 2-4,6-8,10-14 and 16-20 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.

## **DETAILED ACTION**

### ***Claim Objections***

1. Claims 1, 4 and 5 are objected to because of the following informalities: lacking antecedent basis, i.e. "the structure" (claim 1, line 8), "the trenches" (claim 4, lines 15-16) and "the lastly deposited oxide layer" (claim 5, line 3-4).

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 5 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "a larger size bottom electrode" in claim 5 is a relative term, which renders the claim indefinite. The term "a larger size bottom electrode" is not defined by the claim, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

In addition, the term "the oxide layers" renders indefinite because there are two oxide layers.

### ***Double Patenting***

4. Claims 9-20 are objected to under 37 CFR 1.75 as being a substantial duplicate of claims 1, 4-8, i.e. claims 9 and 15 are substantially same as claim 1; claims 10 and 16 are substantially same as claim 4; claims 11 and 17 are substantially same as claim 5; claims 12 and 18 are substantially same as claim 6; claims 13 and 19 are substantially same as claim 7 and claims 14 and 20 are substantially same as claim 8. When two claims in an application are duplicates or

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else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1, 9 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kanaya (US 6,642,563) in view of Tsuzumitani et al. (US 6,645,807).

Kanaya teaches the claimed method of forming an H<sub>2</sub> passivation layer in an FeRAM, comprising:

- preparing a silicon substrate 301;
- depositing a layer of TiO<sub>2</sub> thin film 402 on a damascene structure (Fig.30A);
- etching the TiO<sub>2</sub> film 402 to form a TiO<sub>2</sub> sidewall (Fig.30B);
- depositing a layer of ferroelectric material 304; and
- metallizing a structure to form a FeRAM.

Kanaya does not teach forming a TiO<sub>x</sub> and annealing the TiO<sub>x</sub> to form TiO<sub>2</sub>.

However, TiO<sub>x</sub> is a good adhesion layer, as evidenced by Tsuzumitani et al. (col. 31-41).

Therefore, it would have been obvious to one of the ordinary skill in the art, at the time the invention was made, to form TiO<sub>x</sub> as an adhesion layer, as taught by Tsuzumitani et al., prior to

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form the TiO<sub>2</sub> film via annealing in Kanaya, since by this manner it would benefit the adhesion between adjacent layers.

***Allowable Subject Matter***

7. Claims 2-4 and 6-8 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

8. Claim 5 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

9. The following is a statement of reasons for the indication of allowable subject matter:

The prior art of record at least neither teaches nor suggests threshold adjustment ion implantation; annealing precedes the plasma space etching; and filling trenches so formed with oxide.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hsien-Ming Lee whose telephone number is 571-272-1863. The examiner can normally be reached on M-F (9:00 ~ 5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 571-272-1855. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Hsien-Ming Lee  
Examiner  
Art Unit 2823

Feb.20, 2004

A handwritten signature in black ink, appearing to read 'Hsien-Ming Lee', written in a cursive style.